Dell™ Studio™ 1450/1457/1458 Service Manual

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Model P03G series   Regulatory type P03G001

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I/O Board

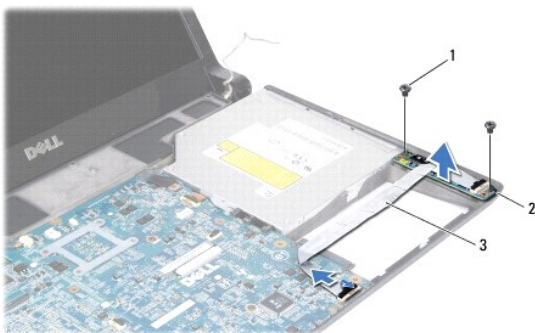
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

Removing the I/O Board

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the base cover (see Removing the Base Cover).
4. Remove the memory modules (see Removing the Memory Module(s)).
5. Remove the hard drive (see Removing the Hard Drive).
6. Remove any installed Mini-Cards (see Removing the Mini-Card).
7. Remove the keyboard (see Removing the Keyboard).
8. Remove the palm rest (see Removing the Palm Rest).
9. Lift the black tab to disconnect the I/O board cable from the connectors on the I/O board and the system board.
10. Remove the two screws that secure the I/O board to the computer base.
11. Lift the I/O board out of the computer base.

1	screws (2)	2	I/O board
3	I/O board cable		

Replacing the I/O Board

1. Follow the instructions in Before You Begin.

2. Place the I/O board on the computer base.
3. Replace the two screws that secure the I/O board to the computer base.
4. Connect the I/O board cable to the connectors on the I/O board and the system board.
5. Replace the palm rest (see Replacing the Palm Rest).
6. Replace the keyboard (see Replacing the Keyboard).
7. Replace the memory modules (see Replacing the Memory Module(s)).
8. Replace the hard drive (see Replacing the Hard Drive).
9. Replace the Mini-Cards, if applicable (see Replacing the Mini-Card).
10. Replace the base cover (see Replacing the Base Cover).
11. Replace the battery (see Replacing the Battery).

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Battery

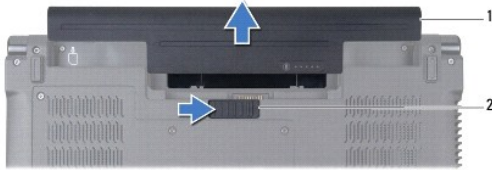
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, you must remove the battery from the battery bay before you begin working inside the computer.

 CAUTION: To avoid damage to the computer, use only the battery designed for this particular Dell™ computer. Do not use batteries designed for other Dell computers.

Removing the Battery

1. Follow the procedures in Before You Begin.
2. Turn the computer over.
3. Slide the battery release latch until it clicks into place.
4. Slide the battery out of the battery bay.

1	battery	2	battery release latch

Replacing the Battery

To replace the battery, slide the battery into the battery bay until it clicks into place.

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Before You Begin

This manual provides instructions for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- You have performed the steps in Turning Off Your Computer and Before Working Inside Your Computer.
- You have read the safety information that shipped with your computer.
- A component can be replaced or—if purchased separately—installed by performing the removal procedure in reverse order.

Recommended Tools

The instructions in this document may require the following tools:

- Small flat screwdriver
- Phillips screwdriver
- Plastic scribe
- Hex nut driver
- BIOS upgrade CD or the BIOS executable update program available on the Dell Support website at **support.dell.com**

Turning Off Your Computer

CAUTION: To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Save and close all open files and exit all open programs.
2. In Microsoft® Windows Vista®, click **Start** , click the arrow , and then click **Shut Down**.

   The computer turns off after the operating system shutdown process finishes.

3. Ensure that the computer is turned off. If your computer did not automatically turn off when you shut down the operating system, press and hold the power button until the computer turns off.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help to ensure your own personal safety.

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

CAUTION: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. Ensure that the work surface is flat and clean to prevent the computer cover from being scratched.

2. Turn off your computer (see Turning Off Your Computer) and all attached devices.

CAUTION: To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

3. Disconnect all telephone or network cables from the computer.

4. Press and eject any installed cards from the ExpressCard slot or the 8-in--1 Media Card Reader.

5. Disconnect your computer and all attached devices from their electrical outlets.

6. Disconnect all attached devices from your computer.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

7. Remove the battery (see Removing the Battery).

8. Turn the computer top-side up, open the display, and press the power button to ground the system board.

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Flashing the BIOS

If a BIOS upgrade CD is provided with the new processor or new system board, flash the BIOS from the CD. If you do not have a BIOS upgrade CD, flash the BIOS from the hard drive.

Flashing the BIOS From a CD

1. Ensure that the AC adapter is plugged in and that the main battery is installed properly.

NOTE: If you use a BIOS upgrade CD to flash the BIOS, set up the computer to boot from a CD before inserting the CD.

2. Insert the BIOS upgrade CD, and restart the computer.

   Follow the instructions that appear on the screen. The computer continues to boot and updates the new BIOS. When the flash update is complete, the computer will automatically reboot.

3. Press <F2> during POST to enter the system setup program.
4. Press <Esc> and then select **Load Setup Defaults** and select **Yes** in the pop-up window to reset the computer defaults.
5. Remove the BIOS upgrade CD from the drive.
6. Select **Exit Saving Changes** and select **Yes** in the pop-up window to save configuration changes.
7. The BIOS upgrade finishes and the computer restarts automatically.

Flashing the BIOS From the Hard Drive

1. Ensure that the AC adapter is plugged in, the main battery is properly installed, and a network cable is attached.
2. Turn on the computer.
3. Go to the Dell Support website at **support.dell.com**.
4. Click **Drivers & Downloads**→ Select **Model**.
5. Select the type of product in the **Select Your Product Family** list.
6. Select the product brand in the **Select Your Product Line** list.
7. Select the product model number in the **Select Your Product Model** list.

   NOTE: If you have selected a different model and want to start over again, click **Start Over** on the top right of the menu.

8. Click **Confirm**.
9. A list of results appear on the screen. Click **BIOS**.
10. Click **Download Now** to download the latest BIOS file.
11. The **File Download** window appears.
12. Click **Save** to save the file on your desktop. The file downloads to your desktop.
13. Click **Close** if the Download Complete window appears.

    The file appears on your desktop and is titled the same as the downloaded BIOS update file.

14. Double-click the file on the desktop and follow the procedures on the screen.

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Internal Module With Bluetooth® Wireless Technology

 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

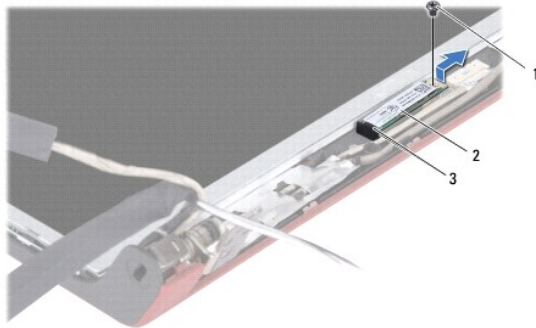
 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

Bluetooth Card

Removing the Bluetooth Card

1. Follow the procedures in Before You Begin.
2. Remove the system board (see Removing the System Board).
3. Remove the WWAN module (see Removing the WWAN Module).
4. Remove the display assembly (see Removing the Display Assembly).
5. Remove the display bezel (see Removing the Display Bezel).
6. Remove the screw that secures the bluetooth card to the bluetooth board.
7. Lift and slide the bluetooth card off the bluetooth board.

1	screw	2	bluetooth card
3	tab		

Replacing the Bluetooth Card

1. Follow the procedures in Before You Begin.
2. Slide the bluetooth card below the tab.
3. Replace the screw that secures the bluetooth card to the bluetooth board.

4. Replace the display bezel (see Replacing the Display Bezel).

5. Replace the display assembly (see Replacing the Display Assembly).

6. Replace the WWAN module (see Replacing the WWAN Module).

7. Replace the system board (see Replacing the System Board).

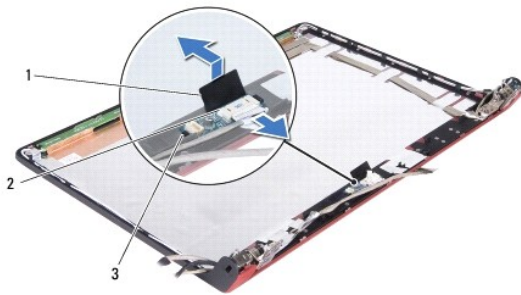
Bluetooth Board

Removing the Bluetooth Board

1. Follow the procedures in Before You Begin.

2. Remove the bluetooth card (see Removing the Bluetooth Card).

3. Disconnect the bluetooth board cable from the bluetooth board cable connector.

4. Using the pull-tab, lift and slide the bluetooth board away from the display cover.

1	pull-tab	2	bluetooth board cable connector
3	tabs (2)		

Replacing the Bluetooth Board

1. Slide the bluetooth board until it is firmly seated under the tabs.

2. Connect the bluetooth board cable to the connector on the bluetooth board.

3. Replace the bluetooth card (see Replacing the Bluetooth Card).

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Camera Module

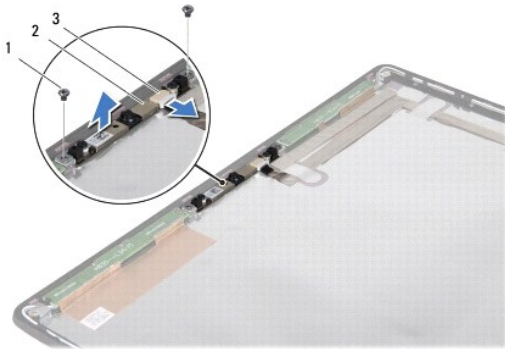
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, remove the main battery (see [Removing the Battery](#)) before working inside the computer.

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

Removing the Camera Module

1. Follow the instructions in [Before You Begin](#).
2. Remove the system board (see [Removing the System Board](#)).
3. Remove the WWAN module (see [Removing the WWAN Module](#)).
4. Remove the display assembly (see [Removing the Display Assembly](#)).
5. Remove the display bezel (see [Removing the Display Bezel](#)).
6. Remove the display panel (see [Removing the Display Panel](#)).
7. Disconnect the camera module cable from the camera module cable connector.
8. Remove the two screws securing the camera module to the display cover.

1	screws (2)	2	camera module
3	camera module cable connector		

9. Lift the camera module off the display cover.

Replacing the Camera Module

1. Follow the instructions in [Before You Begin](#).
2. Align the camera module over the screw holes on the display cover.

3. Replace the two screws that secure the camera module to the display cover.

4. Connect the camera module cable to the connector on the camera module.

5. Replace the display panel (see Replacing the Display Panel).

6. Replace the display bezel (see Replacing the Display Bezel).

7. Replace the display assembly (see Replacing the Display Assembly).

8. Replace the WWAN module (see Replacing the WWAN Module).

9. Replace the system board (see Replacing the System Board).

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Coin-Cell Battery

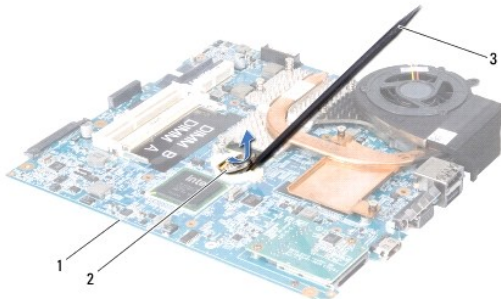
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

Removing the Coin-Cell Battery

1. Follow the procedures in Before You Begin.
2. Remove the system board (see Removing the System Board).
3. Turn the system board over.
4. Use a plastic scribe to push the coin-cell battery upward to release it from the slot.

1	system board	2	coin-cell battery
3	plastic scribe		

Replacing the Coin-Cell Battery

1. Follow the procedures in Before You Begin.
2. Replace the coin-cell battery with the positive (+) side facing upwards.
3. Replace the system board (see Replacing the System Board).

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Base Cover

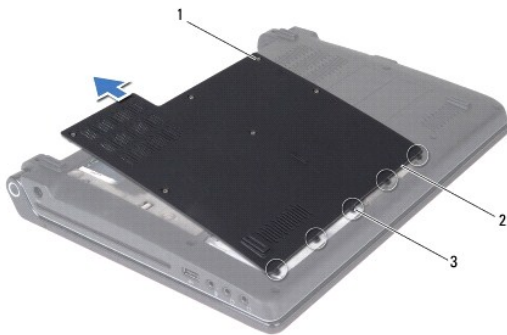
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

Removing the Base Cover

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Turn the computer over and loosen the six captive screws on the base cover.
4. Lift the base cover off the computer.

1	captive screws (6)	2	base cover
3	base cover tabs (5)		

Replacing the Base Cover

1. Follow the instructions in Before You Begin.

CAUTION: If the base cover is difficult to close, remove the cover and replace it. Forcing the cover to close may damage your computer.

2. Align the base cover tabs to the base.
3. Slide the base cover tabs under the base.
4. Tighten the six captive screws that secure the base cover to the computer.
5. Replace the battery (see Replacing the Battery) or connect the AC adapter to your computer and an electrical outlet.
6. Turn on the computer.

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Processor

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

CAUTION: To prevent intermittent contact between the ZIF-socket cam screw and the processor when removing or replacing the processor, press to apply slight pressure to the center of the processor while turning the cam screw.

CAUTION: To avoid damage to the processor, hold the screwdriver such that it is perpendicular to the processor when turning the cam screw.

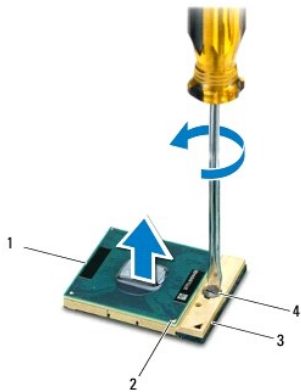
Removing the Processor

1. Follow the instructions in Before You Begin.
2. Remove the system board (see Removing the System Board).
3. Remove the processor heat sink assembly (see Removing the Processor Heat Sink Assembly).

CAUTION: When removing the processor, pull it straight up. Be careful not to bend the pins on the processor.

CAUTION: To prevent intermittent contact between the ZIF-socket cam screw and the processor when removing or replacing the processor, press to apply slight pressure to the center of the processor while turning the cam screw.

4. To loosen the ZIF socket, use a small, flat-blade screwdriver and rotate the ZIF-socket cam screw counterclockwise until it comes to the cam stop.

   The ZIF-socket cam screw secures the processor to the system board. Take note of the arrow on the ZIF-socket cam screw.

1	processor	2	pin-1 corner of processor
3	ZIF socket	4	ZIF-socket cam screw

5. Use a processor extraction tool to remove the processor.

Replacing the Processor

CAUTION: Ensure that the cam lock is in the fully open position before seating the processor. Seating the processor properly in the ZIF socket does not require force.

CAUTION: A processor that is not properly seated can result in an intermittent connection or permanent damage to the processor and ZIF socket.

1. Follow the instructions in Before You Begin.

2. Align the pin-1 corner of the processor so that it points to the triangle on the ZIF socket, and insert the processor into the ZIF socket.

   When the processor is correctly seated, all four corners are aligned at the same height. If one or more corners of the processor are higher than the others, the processor is not seated correctly.

CAUTION: To prevent intermittent contact between the ZIF-socket cam screw and the processor when removing or replacing the processor, press to apply slight pressure to the center of the processor while turning the cam screw.

3. Tighten the ZIF socket by turning the cam screw clockwise to secure the processor to the system board.

4. Peel the backing off the thermal cooling pad and adhere the pad to the portion of the processor heat sink that covers the processor.

5. Replace the processor heat sink assembly (see Replacing the Processor Heat Sink Assembly).

6. Replace the system board (see Replacing the System Board).

7. Update the BIOS using a flash BIOS-update program CD (see Flashing the BIOS).

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Processor Heat Sink Assembly

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

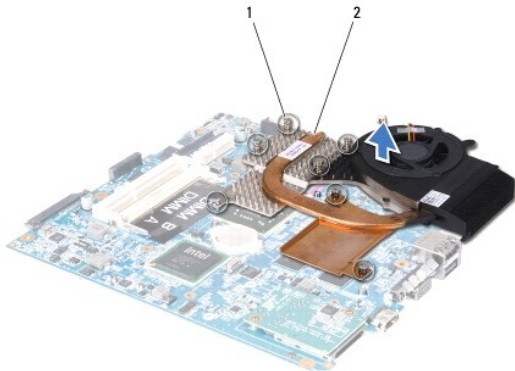
WARNING: If you remove the processor heat sink from the computer when the heat sink is hot, do not touch the metal housing of the heat sink.

CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

Removing the Processor Heat Sink Assembly

1. Follow the instructions in Before You Begin.
2. Remove the system board (see Removing the System Board).
3. Turn the system board over and loosen the seven captive spring screws that secure the processor heat sink assembly to the system board.
4. Lift the processor heat sink assembly off the system board.

1	captive spring screws (7)	2	processor heat sink

Replacing the Processor Heat Sink Assembly

WARNING: Before working inside your computer, follow the safety instructions that shipped with your computer.

CAUTION: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface.

NOTE: The original thermal pad can be reused if the original processor and heat sink are reinstalled together. If either the processor or heat sink is replaced, use the thermal pad provided in the kit to ensure that thermal conductivity is achieved.

NOTE: This procedure assumes that you have already removed the processor heat sink and are ready to replace it.

1. Follow the instructions in Before You Begin.

2. Peel the backing off the thermal cooling pad and adhere the pad to the portion of the heat sink that covers the processor.

3. Place the processor heat sink assembly on the system board.

4. Tighten the seven captive spring screws that secure the processor heat sink assembly to the system board.

5. Replace the system board (see Replacing the System Board).

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Display

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

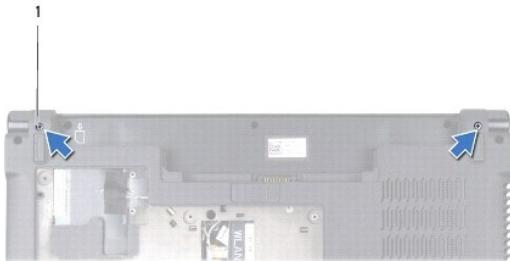
CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

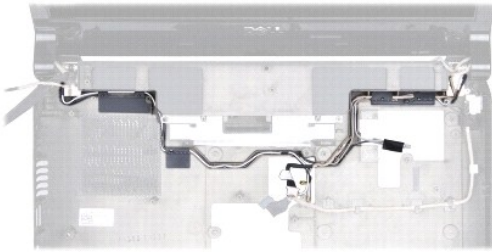
Display Assembly

Removing the Display Assembly

1. Follow the instructions in Before You Begin.
2. Remove the system board (see Removing the System Board).
3. Remove the WWAN module (see Removing the WWAN Module).
4. Remove the two screws at the base of the computer.

1	screws (2)

5. Remove the four screws (two on each side) that secure the display assembly to the computer base.

1	screws (4)

6. Make note of the cable routing and carefully dislodge the cables from their routing guides.

7. Lift the display assembly away from the computer base.

Replacing the Display Assembly

1. Follow the instructions in Before You Begin.
2. Place the display assembly in position and replace the four screws (two on each side) that secure the display assembly to the computer base.
3. Route the cables through the routing guides.
4. Replace the WWAN module (see Replacing the WWAN Module).
5. Replace the system board (see Replacing the System Board).

Display Bezel

Removing the Display Bezel

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: The display bezel is extremely fragile. Be careful when removing it to prevent damaging the bezel.

1. Follow the instructions in Before You Begin.

2. Remove the display assembly (see Removing the Display Assembly).

3. Using your fingertips, carefully pry up the inside edge of the display bezel.

1	display bezel

4. Lift the display bezel off the display assembly.

Replacing the Display Bezel

1. Follow the instructions in Before You Begin.

2. Realign the display bezel over the display panel, and gently snap it into place.

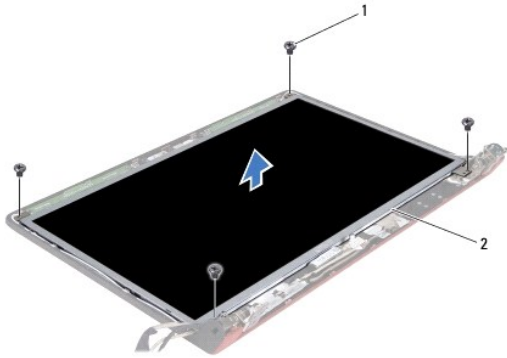
3. Replace the display assembly (see Replacing the Display Assembly).

Display Panel

Removing the Display Panel

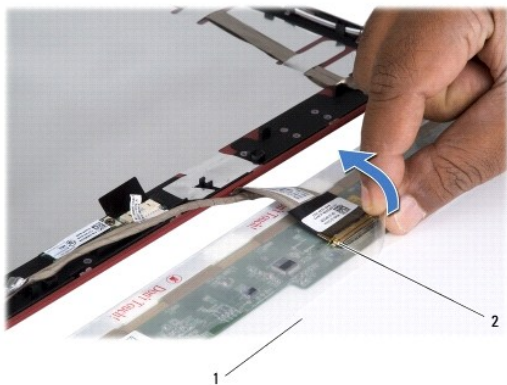
1. Follow the instructions in Before You Begin.

2. Remove the display assembly (see Removing the Display Assembly).

3. Remove the display bezel (see Removing the Display Bezel).

1	screws (4)	2	display panel

4. Remove the four screws that secure the display panel to the display cover.

5. Turn the display panel over and place it on a clean surface.

6. Lift the tape that secures the display panel cable to the connector and remove the cable from the connector.

1	display panel	2	display panel connector

7. Lift the display panel off the display cover.

Replacing the Display Panel

1. Follow the instructions in Before You Begin.

2. Connect the display panel cable to the connector on the display panel and secure it with the tape.

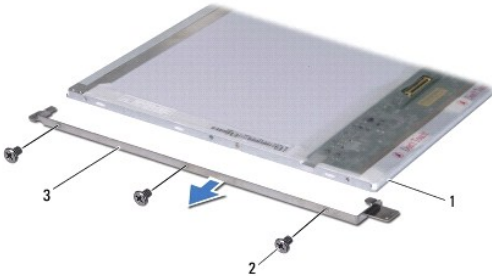
3. Align the display panel with the display cover and replace the four screws that secure the display panel to the display cover.

4. Replace the display bezel (see Replacing the Display Bezel).

5. Replace the display assembly (see Replacing the Display Assembly).

Display Panel Bracket

Removing the Display Panel Bracket

1. Follow the instructions in Before You Begin.
2. Remove the display assembly (see Removing the Display Assembly).
3. Remove the display bezel (see Removing the Display Bezel).
4. Remove the display panel (see Removing the Display Panel).
5. Remove the six screws (three on each side) that secure the display panel brackets to the display panel.

1	display panel	2	screws (6)
3	display panel bracket (2)		

Replacing the Display Panel Bracket

1. Follow the instructions in Before You Begin.
2. Replace the six screws (three on each side) that secure the display panel brackets to the display panel.
3. Replace the display panel (see Replacing the Display Panel).
4. Replace the display bezel (see Replacing the Display Bezel).
5. Replace the display assembly (see Replacing the Display Assembly).

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Hard Drive

WARNING: If you remove the hard drive from the computer when the drive is hot, do not touch the metal housing of the hard drive.

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

CAUTION: To prevent data loss, turn off your computer (see Turning Off Your Computer) before removing the hard drive. Do not remove the hard drive while the computer is On or in Sleep state.

CAUTION: Hard drives are extremely fragile. Exercise care when handling the hard drive.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

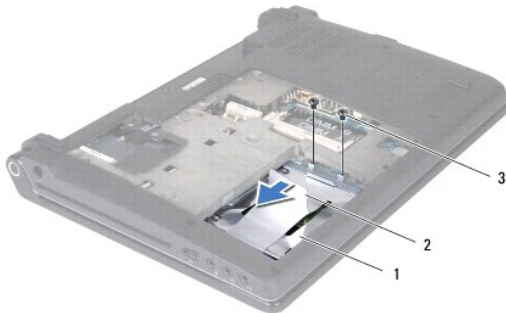
CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

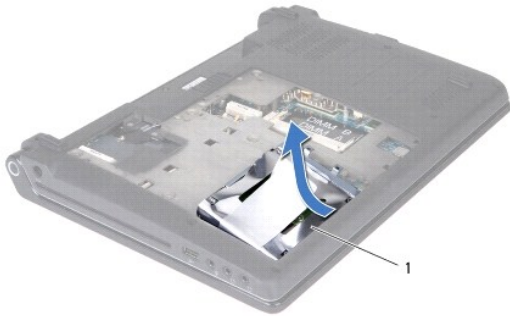
NOTE: Dell does not guarantee compatibility or provide support for hard drives from sources other than Dell.

NOTE: If you are installing a hard drive from a source other than Dell, you need to install an operating system, drivers, and utilities on the new hard drive (see the *Dell Technology Guide*).

Removing the Hard Drive

1. Follow the procedures in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the base cover (see Removing the Base Cover).
4. Remove the two screws that secure the hard drive to the computer base.
5. Slide the hard drive away from the connector using the pull-tab.

NOTE: The pull-tab on your hard drive may vary in appearance.

1	hard drive	2	pull-tab
3	screws (2)		

6. Tilt the hard drive by 45-degrees and lift it out of the computer base.

1	hard drive

7. Remove the four screws that secure the hard drive to the hard drive bracket.

8. Lift the hard drive off the hard drive bracket.

1	hard drive	2	hard drive bracket
3	screws (4)		

CAUTION: When the hard drive is not in the computer, store it in protective antistatic packaging (see "Protecting Against Electrostatic Discharge" in the safety instructions that shipped with your computer).

Replacing the Hard Drive

1. Follow the procedures in Before You Begin.

2. Remove the new drive from its packaging.

   Save the original packaging for storing or shipping the hard drive.

3. Place the hard drive in the hard drive bracket.

4. Replace the four screws that secure the hard drive bracket to the hard drive.

5. Slide the hard drive into the computer base.

6. Slide the hard drive towards the connector using the pull-tab.

7. Replace the two screws that secure the hard drive to the computer base.

8. Replace the base cover (see Replacing the Base Cover).

CAUTION: Before turning on the computer, replace all screws and ensure that no stray screws remain inside the computer. Failure to do so may result in damage to the computer.

9. Replace the battery (see Replacing the Battery).

10. Install the operating system for your computer, as needed (see "Restoring Your Operating System" in the *Setup Guide*).

11. Install the drivers and utilities for your computer, as needed. For more information, see the *Dell Technology Guide*.

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Keyboard

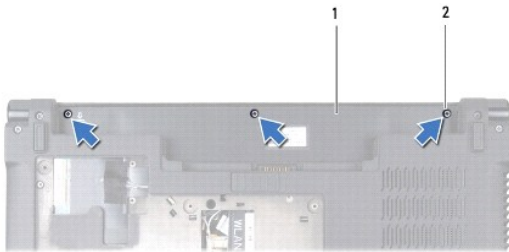
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

Removing the Keyboard

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the three screws in the battery bay.

1	battery bay	2	screws (3)

4. Turn the computer over and open the display.
5. Ease the keyboard surround up using your fingers or a plastic scribe. Lift the edges to separate the keyboard surround from the keyboard.

1	plastic scribe	2	keyboard surround

6. Lift the keyboard surround off the computer.

CAUTION: The keycaps on the keyboard are fragile, easily dislodged, and time-consuming to replace. Be careful when removing and handling the keyboard.

7. Remove the screw at the top of the keyboard.

CAUTION: Be extremely careful when removing and handling the keyboard. Failure to do so could result in damaging the keyboard cable.

8. Carefully slide the keyboard away from the computer as shown in the following illustration.
9. Push the keyboard connector tabs to release the keyboard cable.
10. Disconnect the keyboard cable from the keyboard connector.

1	screw	2	keyboard
3	keyboard cable connector tabs (2)	4	keyboard cable connector
5	keyboard cable	6	palm rest slots (5)
7	keyboard tabs (5)		

11. Lift the keyboard off the computer.

Replacing the Keyboard

1. Follow the instructions in Before You Begin.
2. Slide the keyboard cable into the keyboard cable connector and push the tabs to secure the keyboard cable.
3. Align the tabs along the bottom of the keyboard with the slots on the palm rest.
4. Slide the keyboard tabs under the palm rest.

CAUTION: The keycaps on the keyboard are fragile, easily dislodged, and time-consuming to replace. Be careful when removing and handling the keyboard.

5. Replace the screw at the top of the keyboard.
6. Align the keyboard surround with the palm rest and snap it into place.
7. Replace the three screws in the battery bay.
8. Replace the battery (see Replacing the Battery).

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Memory

 Removing the Memory Module(s)
 Replacing the Memory Module(s)

 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

You can increase your computer memory by installing memory modules on the system board. See "Specifications" in your *Setup Guide* for information on the type of memory supported by your computer. Install only memory modules that are compatible with your computer.

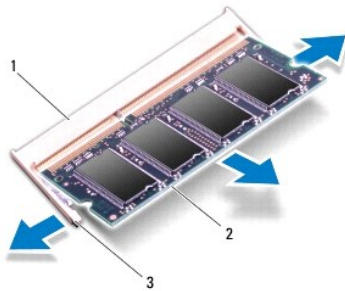
 NOTE: Memory modules purchased from Dell are covered under your computer warranty.

Your computer has two user-accessible SODIMM sockets that can be accessed from the bottom of the computer.

Removing the Memory Module(s)

1. Follow the procedures in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the base cover (see Removing the Base Cover).

CAUTION: To prevent damage to the memory module connector, do not use tools to spread the memory module securing clips.

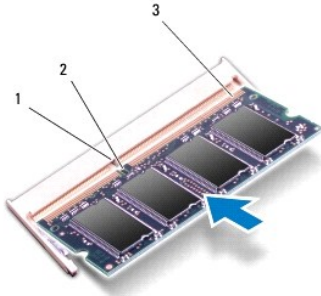
4. Use your fingertips to carefully spread apart the securing clips on each end of the memory module connector until the memory module pops up.
5. Remove the memory module from the memory module connector.

1	memory module connector	2	memory module
3	securing clips (2)		

Replacing the Memory Module(s)

1. Follow the procedures in Before You Begin.

2. Align the notch in the memory module edge connector with the tab in the memory module connector slot.

3. Slide the module firmly into the slot at a 45-degree angle, and press the module down until it clicks into place. If you do not hear the click, remove the module and reinstall it.

NOTE: If the memory module is not installed properly, the computer may not boot.

1	tab	2	notch
3	memory module edge connector		

CAUTION: If the base cover is difficult to close, remove the module and reinstall it. Forcing the base cover to close may damage your computer.

4. Replace the base cover (see Replacing the Base Cover).

5. Replace the battery (see Replacing the Battery), or connect the AC adapter to your computer and an electrical outlet.

6. Turn on the computer.

As the computer boots, it detects the additional memory and automatically updates the system configuration information.

To confirm the amount of memory installed in the computer, click **Start** → **Help and Support**→ **Dell System Information**.

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Wireless Mini-Cards

 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

 NOTE: Dell does not guarantee compatibility or provide support for Mini-Cards from sources other than Dell.

If you ordered a wireless Mini-Card with your computer, the card is already installed.

Your computer supports two Mini-Card slots:

- one full Mini-Card slot – for WWAN
- one half Mini-Card slot – for WLAN

The types of Mini-Cards supported are:

- Wireless Local Area Network (WLAN) — Half Mini-Card
- Mobile broadband or Wireless Wide Area Network (WWAN) — Full Mini-Card

NOTE: Your computer can only support one full Mini-Card and one half Mini-Card at a time.

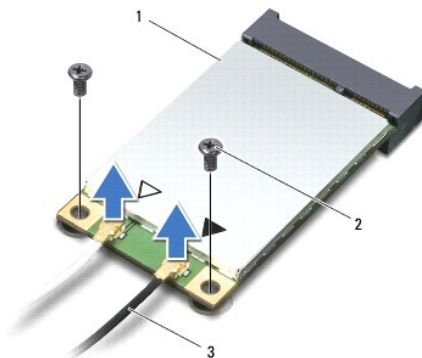
NOTE: The WLAN slot supports a half Mini-Card.

 NOTE: Depending on the configuration of the computer when it was sold, one or more of the Mini-Card slots may not have Mini-Cards installed in them.

Removing the Mini-Card

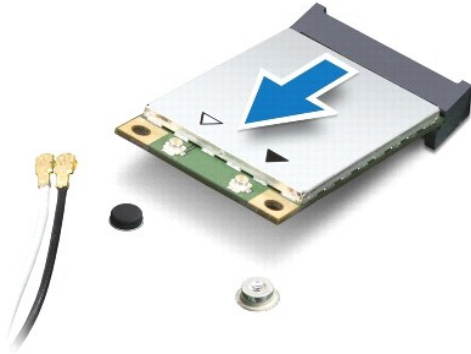
1. Follow the instructions in Before You Begin.
2. Remove the base cover (see Removing the Base Cover).

CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

3. Disconnect the antenna cables from the Mini-Card.

1	Mini-Card	2	screws (2)

3	antenna cables (2)		

4. Remove the two screws that secure the Mini-Card to the system board.

5. Lift the Mini-Card out of the system board connector.

CAUTION: When the Mini-Card is not in the computer, store it in protective antistatic packaging. For more information, see "Protecting Against Electrostatic Discharge" in the safety information that shipped with your computer.

Replacing the Mini-Card

1. Follow the instructions in Before You Begin.

2. Remove the new Mini-Card from its packaging.

CAUTION: Use firm and even pressure to slide the card into place. If you use excessive force, you may damage the connector.

3. Insert the Mini-Card connector at a 45-degree angle into the appropriate system board connector. For example, the WLAN card connector is labeled **WLAN** and so on.

4. Press the other end of the Mini-Card down into the slot on the system board.

5. Replace the two screws that secure the Mini-Card to the system board.

6. Connect the appropriate antenna cables to the Mini-Card you are installing. The following table provides the antenna cable color scheme for each Mini-Card supported by your computer.

Connectors on the Mini-Card	Antenna Cable Color Scheme
WWAN (2 antenna cables)	
Main WWAN (white triangle)	white with gray stripe
Auxiliary WWAN (black triangle)	black with gray stripe
WLAN (2 or 3 antenna cables)	
Main WLAN (white triangle)	white
Auxiliary WLAN (black triangle)	black

7. Secure the unused antenna cables in the protective mylar sleeve.

8. Replace the base cover (see Replacing the Base Cover).

9. Replace the battery (see Replacing the Battery).

10. Install the drivers and utilities for your computer, as required. For more information, see the *Dell Technology Guide*.

NOTE: If you are installing a Mini-Card from a source other than Dell, you must install the appropriate drivers and utilities. For more generic driver information, see the *Dell Technology Guide*.

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Optical Drive

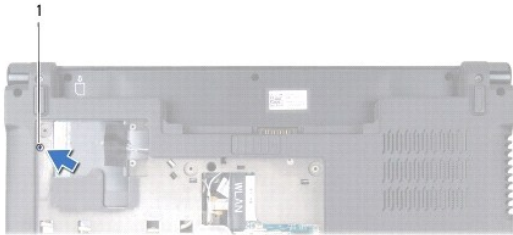
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

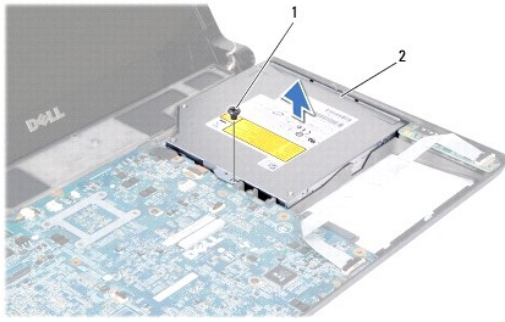
 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

Removing the Optical Drive

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the base cover (see Removing the Base Cover).
4. Remove the memory modules (see Removing the Memory Module(s)).
5. Remove the hard drive (see Removing the Hard Drive).
6. Remove any installed Mini-Cards (see Removing the Mini-Card).
7. Remove the screw that secures the optical drive to the computer base.

1	screw

8. Remove the keyboard (see Removing the Keyboard).
9. Remove the palm rest (see Removing the Palm Rest).
10. Remove the screw that secures the optical drive to the system board.

1	screw	2	optical drive

11. Lift the optical drive away from the computer base.

Replacing the Optical Drive

1. Follow the procedures in Before You Begin.
2. Place the optical drive on the computer base.
3. Replace the screw that secures the optical drive to the system board.
4. Replace the palm rest (see Replacing the Palm Rest).
5. Replace the keyboard (see Replacing the Keyboard).
6. Turn the computer over and replace the screw that secures the optical drive to the computer base.
7. Replace the memory modules (see Replacing the Memory Module(s)).
8. Replace the hard drive (see Replacing the Hard Drive).
9. Replace the Mini-Cards, if applicable (see Replacing the Mini-Card).
10. Replace the base cover (see Replacing the Base Cover).
11. Replace the battery (see Replacing the Battery).

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Palm Rest

 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

 CAUTION: To help prevent damage to the system board, you must remove the battery from the battery bay before you begin working inside the computer.

Removing the Palm Rest

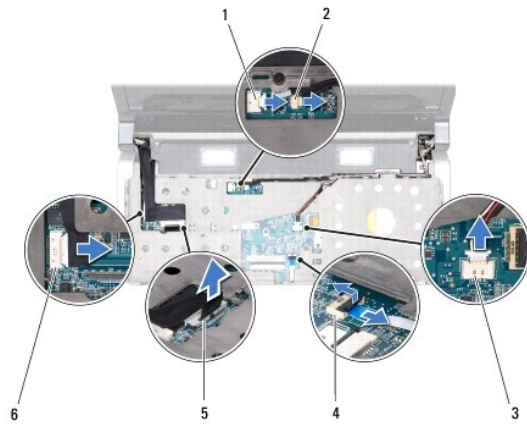
1. Follow the instructions in Before You Begin.
2. Remove any installed cards from the ExpressCard slot or the 8-in-1 Media Card Reader.
3. Remove the battery (see Removing the Battery).
4. Remove the base cover (see Removing the Base Cover).
5. Remove the hard drive (see Removing the Hard Drive).
6. Remove any installed Mini-Cards (see Removing the Mini-Card).
7. Remove the memory modules (see Removing the Memory Module(s)).
8. Remove the keyboard (see Removing the Keyboard).
9. Turn the computer over.
10. Remove the ten screws from the base of the computer.

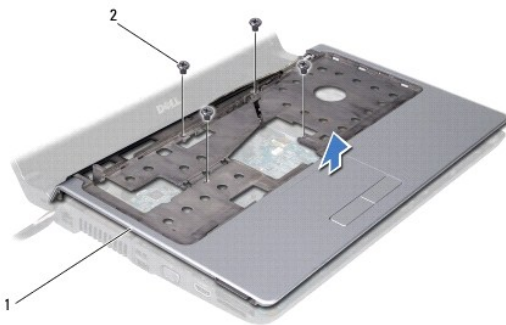
1	screws (10)

 CAUTION: Pull on the plastic tab on top of the connectors to avoid damaging the connectors.

NOTE: Make note of the cable routing before disconnecting the cables.

11. Disconnect the following cables from their corresponding connectors on the system board:

- power button cable — pull the cable away from the connector
- battery indicator cable — pull the cable away from the connector
- speaker module cable — pull the cable away from the connector
- touch pad cable — lift the black tab to disconnect the cable
- display cable — pull the black pull-tab to disconnect the cable
- camera/microphone cable— pull the cable away from the connector

1	power button cable connector	2	battery indicator cable connector
3	speaker module cable connector	4	touch pad cable connector
5	display cable connector	6	camera/microphone cable connector

12. Remove the four screws from the top of the palm rest.

1	palm rest	2	screws (4)

CAUTION: Press and eject any installed cards from the ExpressCard slot or the 8-in--1 Media Card Reader before attempting to remove the palm rest.

13. Starting at the back of the palm rest, use your fingers to gently ease the palm rest from the computer base by lifting the inside of the palm rest while pulling on the outside.

CAUTION: Carefully separate the palm rest from the computer base to avoid damage to the palm rest.

14. Lift the palm rest off the computer base.

Replacing the Palm Rest

1. Follow the instructions in Before You Begin.
2. Route the following cables through the palm rest and connect them to the corresponding connectors on the system board:
   - power button cable
   - battery indicator cable
   - speaker module cable
   - touch pad cable
   - display cable
   - camera/microphone
3. Align the palm rest with the computer base and gently snap the palm rest into place.
4. Replace the four screws on the top of the palm rest.
5. Turn the computer over.
6. Replace the ten screws on the computer base.
7. Replace the keyboard (see Replacing the Keyboard).
8. Replace the hard drive (see Replacing the Hard Drive).
9. Replace the Mini-Cards, if applicable (see Replacing the Mini-Card).
10. Replace the memory modules (see Replacing the Memory Module(s)).
11. Replace the base cover (see Replacing the Base Cover).
12. Replace the battery (see Replacing the Battery).
13. Replace any removed cards in the ExpressCard slot or 8-in-1 Media Card Reader.

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Speaker Module

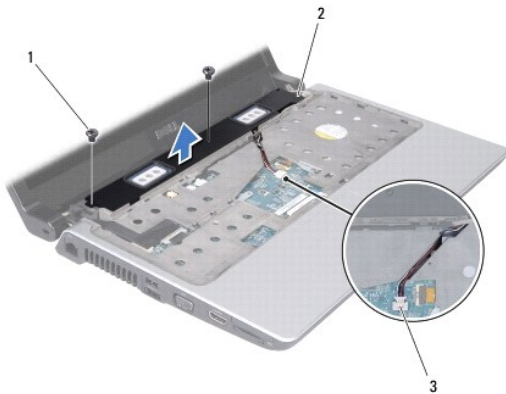
 WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

Removing the Speaker Module

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the keyboard (see Removing the Keyboard).
4. Remove the two screws that secure the speaker module to the computer base.
5. Make note of the speaker module cable routing.
6. Disconnect the speaker module cable from the connector on the system board.
7. Lift the speaker module off the computer base.

1	screws (2)	2	speaker module
3	speaker module cable connector		

Replacing the Speaker Module

1. Follow the instructions in Before You Begin.
2. Replace the speaker module on the computer base and route the speaker module cable along the routing guides.
3. Replace the two screws that secure the speaker module to the computer base.
4. Connect the speaker module cable to its connector on the system board.

5. Replace the keyboard (see Replacing the Keyboard).

6. Replace the battery (see Replacing the Battery).

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System Board

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

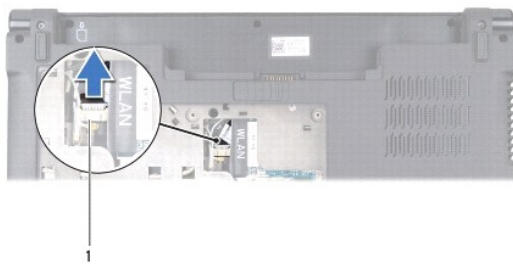
 CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

 CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

The system board's BIOS chip contains the Service Tag, which is also visible on a barcode label on the bottom of the computer. The replacement kit for the system board includes a CD that provides a utility for transferring the Service Tag to the replacement system board.

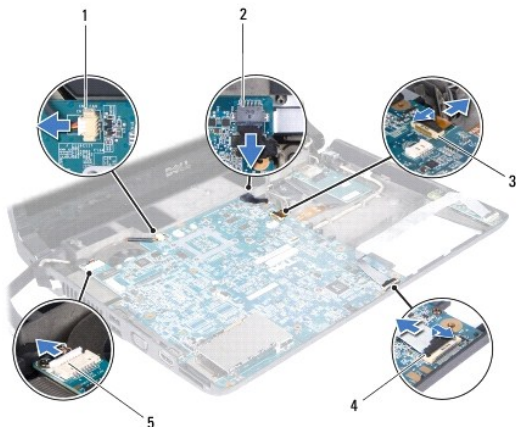
 CAUTION: Handle components and cards by their edges, and avoid touching pins and contacts.

Removing the System Board

1. Follow the instructions in Before You Begin.
2. Remove any installed cards from the ExpressCard slot or the 8-in-1 Media Card Reader.
3. Remove the battery (see Removing the Battery).
4. Remove the base cover (see Removing the Base Cover).
5. Remove the memory modules (see Removing the Memory Module(s)).
6. Remove the hard drive (see Removing the Hard Drive).
7. Remove any installed Mini-Cards (see Removing the Mini-Card).
8. Disconnect the camera cable from the connector on the system board.

1	camera cable connector

9. Remove the keyboard (see Removing the Keyboard).
10. Remove the palm rest (see Removing the Palm Rest).
11. Remove the speaker module (see Removing the Speaker Module).
12. Remove the optical drive (see Removing the Optical Drive).

13. Disconnect the following cables from their corresponding connectors on the system board:

- Fan cable — pull the cable away from the connector
- AC adapter cable — pull the cable away from the connector
- WWAN module cable — lift the black tab and pull the cable away from the connector
- I/O board cable — lift the black tab and pull the cable away from the connector
- Network cable — pull the cable away from the connector

1	Fan cable connector	2	AC adapter cable connector
3	WWAN module cable connector	4	I/O board cable connector
5	Network cable connector		

14. Remove the five screws that secure the system board to the computer base.

15. Lift the system board at an angle toward the side of the computer and out of the computer base.

1	screws (5)	2	system board

Replacing the System Board

1. Follow the instructions in Before You Begin.

2. Place the system board on the computer base.

3. Replace the five screws that secure the system board to the computer base.

4. Connect the following cables to their corresponding connectors on the system board:
   - Fan cable
   - AC adapter cable
   - WWAN module cable
   - I/O board cable
   - Network cable

5. Replace the optical drive (see Replacing the Optical Drive).

6. Replace the speaker module (see Replacing the Speaker Module).

7. Replace the palm rest (see Replacing the Palm Rest).

8. Replace the keyboard (see Replacing the Keyboard).

9. Connect the camera cable to the connector on the system board.

10. Replace the memory modules (see Replacing the Memory Module(s)).

11. Replace the hard drive (see Replacing the Hard Drive).

12. Replace the Mini-Cards, if applicable (see Replacing the Mini-Card).

13. Replace the base cover (see Replacing the Base Cover).

14. Replace the battery (see Replacing the Battery).

15. Replace any installed cards from the ExpressCard slot or 8-in-1 Media Card Reader.

CAUTION: Before turning on the computer, replace all screws and ensure that no stray screws remain inside the computer. Failure to do so may result in damage to the computer.

16. Turn on the computer.

    NOTE: After you have replaced the system board, enter the computer Service Tag into the BIOS of the replacement system board.

17. Enter the service tag (see Entering the Service Tag in the BIOS).

Entering the Service Tag in the BIOS

1. Ensure that the AC adapter is plugged in and that the main battery is installed properly.

2. Turn on the computer.

3. Press <F2> during POST to enter the system setup program.

4. Navigate to the security tab and enter the service tag in the Set Service Tag field.

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WWAN Module

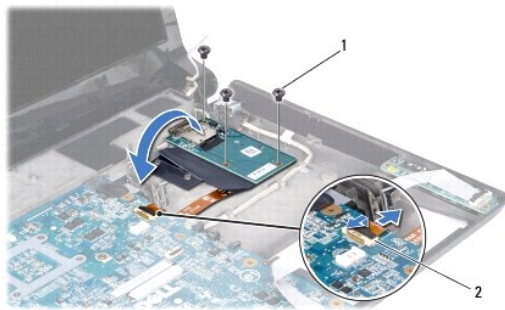
WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

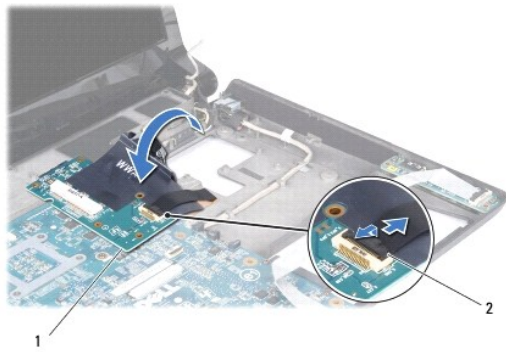
 CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface (such as a connector on your computer).

 CAUTION: To help prevent damage to the system board, remove the main battery (see Removing the Battery) before working inside the computer.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell™ is not covered by your warranty.

Removing the WWAN Module

1. Follow the instructions in Before You Begin.
2. Remove the battery (see Removing the Battery).
3. Remove the base cover (see Removing the Base Cover).
4. Remove the hard drive (see Removing the Hard Drive).
5. Remove the Mini-Cards if applicable (see Removing the Mini-Card).
6. Remove the memory module(s) (see Removing the Memory Module(s)).
7. Remove the keyboard (see Removing the Keyboard).
8. Remove the palm rest (see Removing the Palm Rest).
9. Remove the speaker module (see Removing the Speaker Module).
10. Remove the optical drive (see Removing the Optical Drive).
11. Lift the black tab to disconnect the WWAN module cable from the connector on the system board.
12. Remove the three screws that secure the WWAN module to the computer base

1	screws (3)	2	WWAN connector

13. Turn the WWAN module over and disconnect the WWAN module cable from the connector on the WWAN module.

1	WWAN module	2	WWAN module cable connector

Replacing the WWAN Module

1. Connect the WWAN module cable to the connectors on the WWAN module and the system board.
2. Place the WWAN module on the computer base.
3. Replace the three screws that secure the WWAN module to the computer base.
4. Replace the optical drive (see Replacing the Optical Drive).
5. Replace the speaker module (see Replacing the Speaker Module).
6. Replace the palm rest (see Replacing the Palm Rest).
7. Replace the keyboard (see Replacing the Keyboard).
8. Replace the hard drive (see Replacing the Hard Drive).
9. Replace the Mini-Cards, if applicable (see Replacing the Mini-Card).
10. Replace the memory modules (see Replacing the Memory Module(s)).
11. Replace the base cover (see Replacing the Base Cover).
12. Replace the battery (see Replacing the Battery).

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